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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/752,642	01/07/2004	Naofumi Nakamura	790001-2042	4109
20999	7590	11/29/2005	EXAMINER	
FROMMER LAWRENCE & HAUG 745 FIFTH AVENUE- 10TH FL. NEW YORK, NY 10151			FENTY, JESSE A	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 11/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/752,642

Applicant(s)

NAKAMURA ET AL.

Examiner

Jesse A. Fenty

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-10, 13 and 14 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 5, 6, 11 and 12 is/are rejected.
- 7) ☒ Claim(s) 3 and 4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, 5, 11 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Chan (U.S. Patent No. 6,518,173 B1).

In re claims 1 and 2, Chan (esp. Fig. 6) discloses a semiconductor device, comprising:

at least two wiring layers (11, 22);

a via contact (15) formed between the at least two layers and made of a metal wiring material which is the same as that of the at least two wiring layers (copper);

wherein the metal wiring material of the via contact contains an additive (Cr) which is not contained in the metal wiring materials of the at least two wiring layers.

In re claim 5, Chan (esp. Fig. 6) discloses a semiconductor device, comprising:

at least two wiring layers (11, 22); and

a via contact formed between the at least two layers and made of a metal wiring material (Cu) which is the same as that of the at least two wiring layers,

wherein metal wiring materials of the at least two wiring layers contain at least one additive (Ta), and

a metal wiring material of the via contact contains at least two additives (Ta based compound) which include an additive (Ta) which is the same as that contained in the metal wiring materials of the at least two wiring layers.

In re claims 11 and 12, Chan (esp. Fig. 6) discloses a semiconductor device, comprising:

a first metal wiring layer (11) made of a first wiring material (Cu), formed in a first wiring groove formed in a first insulating film (12) on a semiconductor substrate (8);

a second insulating film (13) on the first insulating film having the first wiring layer embedded therein;

a via contact (15) embedded in a via hole formed in the second insulating film, the via contact being made of the same wiring material as the first wiring material, which contains an additive (Cr) which is not contained in the first wiring material the first wiring layer;

a third insulating film (19) on the second insulating film having the via contact formed therein; and

a second metal wiring layer (22) embedded in a second wiring groove formed in the third insulating film, the second metal wiring layer being made of the same metal wiring material as the metal wiring material of the first metal wiring layer.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chan (as above).

In re claim 6, Chan discloses the device of claim 5, wherein the at least one additive comprises Ta, but does not expressly disclose the at least one additive comprising Ti. Ti is a well known substitute for Ta and it would have been obvious for one skilled in the art at the time of the invention to substitute Ti for Ta in the device of Chan for the purpose, for example, of enhancing the conductivity of the device.

Allowable Subject Matter

5. Claims 3 and 4 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. Claims 7-10, 13 and 14 are allowed.

Response to Arguments

1. Applicant's arguments filed 08/26/05 have been fully considered but they are not persuasive.

a. Regarding claims 1, 2, 5, 11 and 12, Applicant argues that the lining layer disclosed by Chan is not an additive as claimed in the instant application. On the contrary, interpreted broadly, the lining layers disclosed by Chan contribute to the overall interconnect structure of the device and are thus considered "additives" as claimed. For, the lining layers are not such that they prohibit conductivity of the device. Such layers are there simply to prohibit unwanted diffusion of copper from layer to layer. Such layers are essential to the functionality of the device.

i. Further, Chan describes such layers not only as lining layers, but as "adhesion layers," meaning that said layers are actually a part of the copper layers, and can be interpreted as "additive" layers, as claimed.


b. Regarding claim 6, examiner bases the "well known" ability of replacing Ta for Ti on the location of each element on the periodic table. Both metals are well-known transition metals that are frequently used together and/or substituted for one another in interconnect schemes in this art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 571-272-1729. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Parker can be reached on 571-272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Jesse A. Fenty
Examiner
Art Unit 2815